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**SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR**  
(AUTONOMOUS)**B.Tech I Year I Semester (R16) Supplementary Examinations June 2017****ENGINEERING MATHEMATICS - I**

(Common to CE, EEE, ME, ECE &amp; CSE)

(For Students admitted in 2016 only)

Time: **3 hours**Max. Marks: **60**(Answer all Five Units **5 X 12 = 60** Marks)**UNIT-I**

- 1 a. Solve  $x \frac{dy}{dx} + y = \log x$  7M  
 b. Find the orthogonal trajectories of the family of the parabolas  $y^2 = 4ax$  5M

**OR**

- 2 a. Solve  $(D^2 - 4D)y = e^x + \sin 3x$ . 5M  
 b. Solve  $(D^2 + a^2)y = \tan ax$  by the method of variation of parameters 7M

**UNIT-II**

- 3 Expand  $\log_e x$  in powers of  $(x-1)$  and hence evaluate  $\log(1.1)$  correct to 4 decimal places. 12M

**OR**

- 4 a. Verify whether the following functions are functionally dependent, if so find the relation between them,  $u = \frac{x+y}{1-xy}$ ,  $v = \tan^{-1} x + \tan^{-1} y$ . 6M  
 b. Find the radius of curvature at the origin for the curve  $y^4 + x^3 + a(x^2 + y^2) - a^2 y = 0$ . 6M

**UNIT-III**

- 5 a. Evaluate  $\int_0^1 \int_x^{\sqrt{x}} (x^2 + y^2) dx dy$  5M  
 b. Evaluate  $\int_0^1 \int_y^{1-x} \int_0^{1-x} x dz dx dy$  7M

**OR**

- 6 Evaluate the integral by changing the order of integration

$$\int_0^a \int_{x/a}^{\sqrt{x/a}} (x^2 + y^2) dx dy$$

12M

**UNIT-IV**

- 7 a. Find the Laplace transform of  $e^{-3t}(2\cos 5t - 3\sin 5t)$  6M  
 b. Find the Laplace transform of  $f(t) = 2\cosh at \cdot \sin bt$  6M

**OR**

- 8 a. Find Laplace Transform of Square-wave function of period  $2a$ , defined as  

$$f(t) = \begin{cases} k, & 0 < t < a \\ -k, & a < t < 2a \end{cases}$$
 7M  
 b. Find the Laplace transform of  $f(t) = t \sin 3t \cdot \cos 2t$  5M

**UNIT-V**

- 9 a. Evaluate  $L^{-1}\left\{\frac{1}{2}\log\left(\frac{s^2 + b^2}{s^2 + a^2}\right)\right\}$  6M  
 b. Evaluate  $L^{-1}\left\{\int_s^\infty \log\left(\frac{u-1}{u+1}\right) du\right\}$  6M

**OR**

- 10 Use transform method to solve  $y'' + 2y' + 5y = e^{-t} \sin t$ , where  
 $y(0) = 1, y'(0) = 1$  12M

**\*\*\* END \*\*\***